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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/722,048	11/25/2003	Mark Andrew Whittaker Stewart	IS01456MCG	8342

23330 7590 02/21/2008
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EXAMINER

LOO, JUVENA W

ART UNIT	PAPER NUMBER
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2616

MAIL DATE	DELIVERY MODE
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02/21/2008

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/722,048

Applicant(s)

STEWART, MARK ANDREW
WHITTAKER

Examiner

Juvena W. Loo

Art Unit

2616

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 28 December 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-5, 7-15, 17 and 19-23 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-5, 7-15, 17, and 19-23 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- ☒ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☐ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____
- ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- ☐ Notice of Informal Patent Application
- ☐ Other: _____

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1-2, 5, 7-12, 17, and 19-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Karp (5,469,154) in view of Foster et al. (US 2002/0181395 A1).

Karp discloses a multi-stage switching network for connecting any one of output ports to any one of input ports comprising the features:

As per claim 1, a method, comprising:

providing a plurality of first stage switches (Karp: see Figure 6, first stage (20-10x20) crossbars);

providing a plurality of second stage switches coupled to each of the plurality of first stage switches (Karp: see Figure 6, second stage (20-20x5) crossbars), wherein the plurality of second stage switches are coupled to each of the plurality of first stage switches to form a CLOS network (Karp: see "FIG. 6 is a two-stage 100x100...input-output paths" in column 13, lines 49 – 55 and "A key property...being non-blocking" in column 14, line 63 through column 15, line 1);

providing a plurality of sources coupled to the CLOS network (Karp: see Figure 1, 2);

providing a plurality of destinations coupled to the CLOS network (Karp: see Figure 1, 3).

and wherein the forwarding instructions create a path between each of the plurality of sources and each of the plurality of destinations to make the CLOS network operate as a strictly non-interfering network (Karp: see "Multi-stage switching...a single input port" in Abstract).

However, Karp does not explicitly disclose the features: *calculating a plurality of routing trees each routing tree comprising the plurality of first stage switches and one of the plurality of second stage switches; calculating a plurality of Destination Location Identifiers (DLID) and a set of forwarding instructions for each of the plurality of first stage and second stage switches, wherein each of the plurality of DLIDs corresponds to one of the plurality of routing trees and one of the plurality of destinations; and populating a forwarding table of each of the plurality of first stage and second stage switches in the CLOS network with the plurality of DLIDs and the set of forwarding instructions.*

Foster et al. discloses a technique for communicating data through a network comprising the following features:

calculating a plurality of routing trees each routing tree comprising the plurality of first stage switches and one of the plurality of second stage switches (Foster: see Figure 11 and "FIG. 11 is a flow diagram...next virtual identifier" in page 15, section 0114; see also "in some embodiment...destination node" in page 12, section 0097);

calculating a plurality of Destination Location Identifiers (DLID) and a set of forwarding instructions for each of the plurality of first stage and second stage switches, wherein each of the plurality of DLIDs corresponds to one of the plurality of routing trees and one of the plurality of destinations (Foster: see Figure 11 and "FIG. 11 is a flow diagram...next virtual identifier" in page 15, section 0114; see also "in some embodiment...destination node" in page 12, section 0097); and

populating a forwarding table of each of the plurality of first stage and second stage switches in the CLOS network with the plurality of DLIDs and the set of forwarding instructions (Foster: see "Each IFM may maintain...are to be forwarded" in page 6, section 0060).

It would have been obvious to one of the ordinary skill in the art at the time of the invention to modify the system of Karp using the features, as taught by Foster et al., in order to enable communication of data through a network to destinations (Foster: see page 3, section 0038).

Regarding claim 2, *wherein each of the plurality of destinations is identified by a BaseLID (Foster: see Figure 1, Node N+1, 105 and Figure 2B, column 213).*

Regarding claim 5, *further comprising:*

creating a packet at one of the plurality of sources, wherein the packet is addressed to one of the plurality of destinations (Foster: see Figure 7, 700; see also "The routine receives indications...appropriate information" in page 11, section 0093 and "as part of registering...appropriate destinations" in page 12, section 0097);

executing a rearrangement algorithm for the CLOS network (Foster: see Figure 7, 725, 730, and 735; see also "If it is instead determined...missing or incorrect" in page 11, sections 0094 – 0095; see also "as part of registering...to the destination node" in page 12, section 0097);

assigning one of the plurality of DLIDs to the packet (Foster: see Figure 7, 725, 73, 735, and 740; see also "If it is instead determined...translation table" in page 11, sections 0094 – 0095; see also "as part of registering...to the destination node" in page 12, section 0097); *and*

the packet following a path from the one of the plurality of sources, through one of the plurality of first stages switches and one of the plurality of second stage switches, to the one of the plurality of destinations, wherein the one of the plurality of first stage switches and the one of the plurality of second stage switches forward the packet according to the one of the plurality of DLIDs assigned to the packet (Foster: see Figure 7, 740 and "the routine continues to step 740...translation table" in page 11, section 0095).

Regarding claim 7, *wherein the packet following the path comprises looking up the one of the plurality of DLIDs assigned to the packet in the forwarding table in the one of the plurality of first stage switches and in the one of the plurality of second stage switches along the path from the one of the plurality of sources to the one of the plurality of destinations* (Foster: see Figure 7, 740 and "the routine continues to step 740...translation table" in page 11, section 0095; see also "When the source node...destination-side ports" in page 12, section 0098).

Regarding claim 8, *wherein calculating the plurality of routing trees comprises calculating the plurality of routing trees sufficient to execute the rearrangement algorithm* (Foster: see Figure 7, 725, 73, 735, and 740; see also "If it is instead determined...translation table" in page 11, sections 0094 – 0095; see also "as part of registering...to the destination node" in page 12, section 0097).

Regarding claim 9, *wherein the packet following the path comprises the one of the plurality of first stage switches and the one of the plurality of second stage switches forwarding the packet in accordance with the one of the plurality of DLIDs assigned to the packet as found in the forwarding table in the one of the plurality of first stage switches and in the one of the plurality of second stage switches* (Foster: see Figure 7, 740 and "the routine continues to step 740...translation table" in page 11, section 0095; see also "When the source node...destination-side ports" in page 12, section 0098).

Regarding claim 10, *a method, comprising:*

providing a plurality of first stage switches (Karp: see Figure 6, first stage (20-10x20) crossbars) and a plurality of second stage switches (Karp: see Figure 6, second stage (20-20x5) crossbars) coupling a plurality end nodes to one another to form a network, the plurality of second stage switches coupled to each of the plurality of first stage switches (Karp: see "FIG. 6 is a two-stage 100x100...input-output paths" in column 13, lines 49 – 55 and "A key property...being non-blocking" in column 14, line 63 through column 15, line 1);

and wherein the forwarding instructions create a path between each of the plurality of end nodes that enables the network operate as a strictly non-interfering network (Karp: see "Multi-stage switching...a single input port" in Abstract).

However, Karp does not explicitly disclose the features: *calculating a plurality of routing trees comprising the plurality of first stage switches and one of the plurality of second stage switches; calculating a plurality of Destination Location Identifiers (DLID) and a set of forwarding instructions for each of the plurality of first stage and second stage switches, wherein each of the plurality of DLIDs corresponds to one of the plurality of routing trees and one of the plurality of end nodes; and populating a forwarding table of each of the plurality of first stage and second stage switches with the plurality of DLIDs and the set of forwarding instructions.*

Foster et al. discloses a technique for communicating data through a network comprising the following features:

calculating a plurality of routing trees comprising the plurality of first stage switches and one of the plurality of second stage switches (Foster: see Figure 11 and "FIG. 11 is a flow diagram...next virtual identifier" in page 15, section 0114; see also "in some embodiment...destination node" in page 12, section 0097);

calculating a plurality of Destination Location Identifiers (DLID) and a set of forwarding instructions for each of the plurality of first stage and second stage switches, wherein each of the plurality of DLIDs corresponds to one of the plurality of routing trees and one of the plurality of end nodes (Foster: see Figure 11 and "FIG. 11 is a flow diagram...next virtual identifier" in page 15, section 0114; see also "in some embodiment...destination node" in page 12, section 0097); and

populating a forwarding table of each of the plurality of first stage and second stage switches with the plurality of DLIDs and the set of forwarding instructions (Foster: see "Each IFM may maintain...are to be forwarded" in page 6, section 0060).

It would have been obvious to one of the ordinary skill in the art at the time of the invention to modify the system of Karp using the features, as taught by Foster et al., in order to enable communication of data through a network to destinations (Foster: see page 3, section 0038).

Regarding claim 11, *wherein the network is a CLOS network* (Karp: see "Multi-stage switching...a single input port" in Abstract).

Regarding claim 12, *wherein each of the plurality of end nodes comprises a destination, and wherein the destination is identified by a BaseLID* (Foster: see Figure 1, Node N+1, 105 and Figure 2B column 213).

Regarding claim 17, a method, comprising:

providing a plurality of first stage switches (Karp: see Figure 6, first stage (20-10x20) crossbars) *and a plurality of second stage switches* (Karp: see Figure 6, second stage (20-20x5) crossbars) *coupling a plurality destinations to a plurality of destinations to form a CLOS network, the plurality of second stage switches coupled to each of the plurality of first stage switches* (Karp: see "FIG. 6 is a two-stage 100x100... input-output paths" in column 13, lines 49 – 55 and "A key property...being non-blocking" in column 14, line 63 through column 15, line 1);

and wherein the path is part of the CLOS network operating as a strictly non-interfering network (Karp: see "Multi-stage switching...a single input port" in Abstract).

However, Karp does not explicitly disclose the features: *creating a packet at one of the plurality of sources, wherein the packet is addressed to one of the plurality of destinations; executing a rearrangement algorithm for the CLOS network; assigning one of a plurality of Destination Location Identifiers (DLIDs) to the packet; and the packet*

following a path from the one of the plurality of sources, through one of the plurality of first stage switches and one of the plurality of second stage switches, to the one of the plurality of the destinations, wherein the one of the plurality of first stage switches and the one of the plurality of second stage switches forward the packet according to the one of the plurality of DLIDs assigned to the packet.

Foster et al. discloses a technique for communicating data through a network comprising the following features:

creating a packet at one of the plurality of sources, wherein the packet is addressed to one of the plurality of destinations (Foster: see Figure 7, 700; see also "The routine receives indications...appropriate information" in page 11, section 0093 and "as part of registering...appropriate destinations" in page 12, section 0097);

executing a rearrangement algorithm for the CLOS network (Foster: see Figure 7, 725, 730, and 735; see also "If it is instead determined...missing or incorrect" in page 11, sections 0094 – 0095; see also "as part of registering...to the destination node" in page 12, section 0097);

assigning one of a plurality of Destination Location Identifiers (DLIDs) to the packet (Foster: see Figure 7, 725, 730, 735, and 740; see also "If it is instead determined... translation table" in page 11, sections 0094 – 0095; see also "as part of registering...to the destination node" in page 12, section 0097); and

the packet following a path from the one of the plurality of sources, through one of the plurality of first stage switches and one of the plurality of second stage switches, to the one of the plurality of the destinations, wherein the one of the plurality of first stage switches and the one of the plurality of second stage switches forward the packet according to the one of the plurality of DLIDs assigned to the packet (Foster: see Figure 7, 725, 730, 735, and 740; see also "If it is instead determined... translation table" in page 11, sections 0094 - 0095).

It would have been obvious to one of the ordinary skill in the art at the time of the invention to modify the system of Karp et al. using the features, as taught by Foster et al., in order to enable communication of data through a network to destinations (Foster: see page 3, section 0038).

Regarding claim 19, *wherein the packet following the path comprises looking up the one of the plurality of DLIDs assigned to the packet in a forwarding table in the one of the plurality of first stage switches and in the one of the plurality of second stage switches along the path from the one of the plurality of source to the one of the plurality of destinations (Foster: see Figure 7, 740 and "the routine continues to step 740...translation table" in page 11, section 0095; see also "When the source node...destination-side ports" in page 12, section 0098).*

Regarding claim 20, *wherein the packet following the path comprises the one of the plurality of first stage switches and the one of the plurality of second stage switches forwarding the packet in accordance with the one of the plurality of DLIDs assigned to the packet as found in a forwarding table in the one of the plurality of first stage switches and in the one of the plurality of second stage switches* (Foster: see Figure 7, 740 and "the routine continues to step 740...translation table" in page 11, section 0095; see also "When the source node...destination-side ports" in page 12, section 0098).

3. Claims 3-4, 13-15, and 21-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Karp (5,469,154) in view of Foster et al. (US 2002/0181395 A1) above, and further in view of Brahmaroutu (US 2003/0033427 A1).

Karp and Foster et al. disclose all the limitations as in paragraph 2 above. Karp and Foster et al. do not explicitly disclose the following features: *regarding claim 3, wherein each of the plurality of second stage switches comprises a spine node, and wherein calculating the plurality of routing trees comprises, for each spine node in the CLOS network, calculating a first shortest path from each spine node to each of the plurality of sources and each of the plurality of destinations; regarding claim 4, wherein each of the plurality of second stage switches comprises a spine node, and wherein each of the plurality of routing trees comprises a plurality of links that form a second shortest path from one of the plurality of sources or one of the plurality of destinations to*

[[a]] each spine node; regarding claim 13, wherein each of the plurality of second stage switches comprises a spine node, and wherein calculating the plurality of routing trees comprises, for each spine node in the network, calculating a shortest path from each spine node to each of the plurality of end nodes; regarding claim 14, wherein each of the plurality of second stage switches comprises a spine node, and wherein each of the plurality of routing trees comprises a plurality of links that form a shortest path from each of the plurality of end nodes to [[a]] each spine node; regarding claim 15, wherein each shortest path is loop-less; regarding claim 21, wherein each of the plurality of first stage switches and each of the plurality of second stage switches is an INFINIBAND switch in compliance with an INFINIBAND Architecture Specification; regarding claim 22, wherein each of the plurality of first stage switches and each of the plurality of second stage switches is an INFINIBAND switch in compliance with an INFINIBAND Architecture Specification; regarding claim 23, wherein each of the plurality of first stage switches and each of the plurality of second stage switches is an INFINIBAND switch in compliance with an INFINIBAND Architecture Specification.

Brahmaroutu discloses a mechanism to program forwarding tables comprising the following features:

Regarding claim 3, *wherein each of the plurality of second stage switches comprises a spine node (Brahmaroutu: see Figure 4), and wherein calculating the plurality of routing trees comprises, for each spine node in the CLOS network,*

calculating a first shortest path from each spine node to each of the plurality of sources and each of the plurality of destinations (Brahmaroutu: see Figure 6 and "FIG. 6 illustrates...recorded in TABLE 1" in page 5, sections 0040 – 0042; see also "TABLE 2 shows...the destination switch" in page 6, section 0047).

Regarding claim 4, wherein each of the plurality of second stage switches comprises a spine node (Brahmaroutu: see Figure 4), and wherein each of the plurality of routing trees comprises a plurality of links that form a second shortest path from one of the plurality of sources or one of the plurality of destinations to each spine node (Brahmaroutu: see Figure 6 and "FIG. 6 illustrates...recorded in TABLE 1" in page 5, sections 0040 – 0042; see also "TABLE 2 shows...the destination switch" in page 6, section 0047).

Regarding claim 13, wherein each of the plurality of second stage switches comprises a spine node, and wherein calculating the plurality of routing trees comprises, for each spine node in the network, calculating a shortest path from each spine node to each of the plurality of end nodes (Brahmaroutu: see Figure 6 and "FIG. 6 illustrates...recorded in TABLE 1" in page 5, sections 0040 – 0042; see also "TABLE 2 shows...the destination switch" in page 6, section 0047).

Regarding claim 14, wherein each of the plurality of second stage switches comprises a spine node, and wherein each of the plurality of routing trees comprises a plurality of links that form a shortest path from each of the plurality of end nodes to each

spine node (Brahmaroutu: see "Then the subnet manager...other switch" in page 5, section 0046).

Regarding claim 15, *wherein each shortest path is loop-less* (Brahmaroutu: see "The subnet manager...multiple LIDs" in page 6, section 0055).

Regarding claim 21, *wherein each of the plurality of first stage switches and each of the plurality of second stage switches is an INFINIBAND switch in compliance with an INFINIBAND Architecture Specification* (Brahmaroutu: see "According to...by the InfiniBand™ Trade Association" in page 2, section 0021).

Regarding claim 22, *wherein each of the plurality of first stage switches and each of the plurality of second stage switches is an INFINIBAND switch in compliance with an INFINIBAND Architecture Specification* (Brahmaroutu: see "According to...by the InfiniBand™ Trade Association" in page 2, section 0021).

Regarding claim 23, *wherein each of the plurality of first stage switches and each of the plurality of second stage switches is an INFINIBAND switch in compliance with an INFINIBAND Architecture Specification* (Brahmaroutu: see "According to...by the InfiniBand™ Trade Association" in page 2, section 0021).

It would have been obvious to one of the ordinary skill in the art at the time of the invention to modify the system of Karp with Foster et al. using the features, as taught by Brahmaroutu, in order to program switch forwarding tables without any routing ambiguity (Brahmaroutu: see "The subnet manager...between switches" in page 6, section 0059).

Response to Arguments

4. Applicant's arguments with respect to claims 1-5, 7-15, 17, and 19-23 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Juvena W. Loo whose telephone number is (571) 270-1974. The examiner can normally be reached on Monday - Friday: 7:30am-4:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kwang Yao can be reached on (571) 272-3182. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

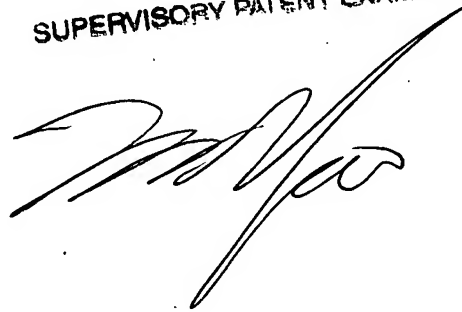
Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should

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you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

KWANG BIN YAO
SUPERVISORY PATENT EXAMINER

A handwritten signature in black ink, appearing to read 'Kwang Bin Yao', is written over the printed name and title.